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REVIEWS

The Geology of Hardin County and the Adjoining Part of Pope County. By STUART WELLER with the collaboration of CHARLES BUTTS, L. W. CURRIER, and R. D. SALISBURY. Illinois Geological Survey, Bull. No. 41, 1920. Pp. 377, pls. 11, figs. 27.

This report represents the results of three seasons' field work by the author in conjunction with Messrs. Butts and Lee of the U.S. Geological Survey and part of two seasons by Mr. Currier in the study of the fluor-spar deposits of the county. In addition a chapter on the geography of the region is contributed by Mr. Salisbury.

Hardin County lies in the southeastern part of the state and wholly within the Ozark country, an area of considerable relief and in a mature stage of dissection. The history of the topography involves four periods of uplift, the three cycles of erosion other than the present one, being known as the Karber's Ridge, McFarlan, and Elizabethtown cycles.

Structurally the area is characterized by rather flat-lying strata surrounding an area of doming and intense faulting. The faults are of the normal type and form a network along the edges of the dome which is roughly circular in outline. They originated through the collapse of the dome. Likewise remarkable is the presence within the region of igneous intrusives in the form of dikes, sills, and plugs. The origin of the dome involves the intrusion of these rocks, the collapse following either the gradual spreading out of the lava or its partial withdrawal. The structure is remarkable and has but few known parallels.

The rock formations of the region include Devonian, Mississippian, and Pennsylvanian sediments, involving a thickness of some 4,000 feet. Of special note is the contribution to the knowledge of the Chester group.

The oldest formation present, known locally as the Devonian limestone, is correlated with the Lower Devonian, Onondaga, and Hamilton. Lithologically it is a unit. The overlying Chattanooga shale contains but a meager fauna and from its stratigraphic relation may be correlated with either the Upper Devonian or Lower Mississippian, or both.

The Meramec group, as originally defined by Ulrich, included the Warsaw, Spergen, and St. Louis limestones. A study of the Ste. Genevieve faunas convinces Professor Weller that this formation is much

more closely related to the St. Louis group than to the Chester with which Ulrich had allied it, chiefly due to the presence of a species of the typical Chester genus *Coelocornus*. On this basis and the recent recognition of an unconformity separating the Renault and Ste. Genevieve formations, Weller redefines the Meramec group so as to include the Ste. Genevieve.

This report represents the most recent work on the subdivision of the Chester and the correlation of these units. Especial attention is called to the following corrections of previous correlations of the formations of southeastern Illinois and Kentucky with those of Randolph County: (1) the Renault and Shelterville formations, the Upper Ohara of Ulrich, are correlated with the Renault. Professor Weller considers those species of the genus *Talarocrinus* with the thickened plates forming bilobed basis as very characteristic of the Lower Chester. This fauna is typically developed in the Upper Ohara; (2) the Golconda limestone with the Lower Okaw; (3) the Cypress sandstone with the Ruma; and (4) the Bethel sandstone with the Yankeetown formation. Methods of correlation are discussed in detail.

The igneous rocks of the region are found chiefly in the vicinity of the Ohio River where the more rapid erosion has exposed them. They are of three types: fine-grained, dark-colored lamprophyres, medium-grained, dark-colored peridotites, and volcanic breccia.

Economically Hardin County is noted for its fluorite deposits, the annual output of the county being over two-thirds that of the country. Fluorite occurs as (1) vein deposits, replacing calcite fillings of the fault planes; (2) bedded deposits where fluorite has replaced limestone bedrock; and (3) superficial residual deposits. Small quantities of lead and zinc are recovered incidental to the fluorspar exploitation. The origin of the deposits involves (1) doming and faulting in post-Pennsylvanian, (2) deposition of calcite in the fault fissures, (3) mineralization by fluoriferous magmatic solutions replacing calcite, and (4) the introduction of metallic sulphides.

The only other large resource of the region is agriculture. There is an abundance of limestone suitable for lime, cement, and ground rock for fertilizer, as well as an unlimited supply for road metal. In regard to the oil and gas possibilities, while the structure is favorable, but little is known of the underlying pre-Devonian sediments.

In the portion of the bulletin devoted to systematic paleontology, the work is limited to those common species in need of further illustration and description and to those forms important for their bearing upon

the correlation problems. The majority of these are Chester forms, together with some Ste. Genevieve and St. Louis species. Of interest is a new species of *Septopora*, *S. similis* from the lower St. Louis which is almost identical in character with the Chester *S. subquadrans*. This occurrence is noteworthy in that the genus *Septopora* has hitherto been considered highly characteristic of the Chester. Seventy-two species are described and figured, prominent among which are species of *Talarocrinus* and *Pentremites*.

A. C. McF.

On the Crinoid Genus Scyphocrinus and Its Bulbous Root Camarocrinus. By FRANK SPRINGER. Memoir Smithsonian Institution, 1917. Pp. 74, pls. 9, figs. 16.

For more than a half-century there have been known to paleontologists certain bulb-like, supposedly crinoidal or cystoidal, bodies which were described from American localities in 1869 by Hall as *Camarocrinus*. Similar structures had been known for some time from the Silurian of Bohemia where they had been found by Barrande. He had named them *Lobolithus* without describing them.

In 1904 Schuchert summarized all the known facts touching the occurrence and relations of this form. He found that these structures were of widespread occurrence in both Bohemia and America. In the former they were confined to a horizon equivalent to the American Rochester shale, and in the latter to the Manlius and Helderbergian. In Bohemia they were commonly associated with the genus *Scyphocrinus* which was as yet undescribed from America. They were frequently found in beds void of any other crinoidal remains and a large majority were found in strata with their stalked end down. He came to the conclusion that

Camarocrinus thus appears to be the float of an unknown crinoid, that was held together after the death of the individual by the firmly interlocked double walls of the exterior and interior, while the crown and stalk dropped away. Under this hypothesis the float drifted with the sea currents, was finally filled with water and, the attenuated end being heavier, sank in that position.

It is the purpose of this paper to present the results of some later studies by Mr. Springer which have resulted in a change in the conception as to the functional nature of the so-called *Camarocrinus*. He finds not only that the genus *Scyphocrinus* does occur in abundance in America but that the *Camarocrinus* bulbs are directly connected at the distal end of the stem of crinoids belonging to that genus. Moreover